

REMARKS

The Office Action dated August 24, 2010, has been received and carefully noted. The above amendments and the following remarks together with the attached Request for Continued Examination (RCE) are submitted as a full and complete response thereto.

Claims 8-19 are rejected. Claims 8 and 16 are amended, and Claim 19 is cancelled. Claims 1-7 are withdrawn from further consideration in this application. Thus, Claims 8-18 are pending in this application and subject to examination. Support for the amendments may be found in the specification as originally filed, such as in paragraphs [0025] to [0026]. The Applicants submit that no new matter is added. The Applicants respectfully request reconsideration and withdrawal of the rejections.

Claim Rejections – 35 U.S.C. §103

Claims 8-19 are rejected under 35 U.S.C. §103(a) as being unpatentable over Yamoto (U.S. Patent Publication No. 2002/0104477, hereinafter “Yamoto”) in view of Wang (U.S. Patent Publication No. 2004/0121085, hereinafter “Wang”), Nguyen (U.S. Patent No. 6,689,220, hereinafter “Nguyen”), as evidenced by Raaijmakers (U.S. Patent Publication No. 2002/0052124, hereinafter “Raaijmakers”). To the extent applicable to the claims as amended, the Applicants respectfully traverse this rejection.

Claim 8, as amended, recites a method for forming a laminated thin SiN film on a substrate comprising, among other features, an activating step of generating active species by bringing a thin-film-component gas containing silicon, a gas containing nitrogen component, and a hydrogen gas into contact with the exothermic catalyst body,

thereby generating active species of the gases; a film forming step of forming a thin SiN film for each unit layer on a substrate; ***a surface treating step of surface-treating the thin film for each unit layer by the hydrogen gas active species; another surface treating step of surface-treating the thin film for each unit layer by the active species of the gas containing nitrogen component***, and repeating one of the one surface treating step and the other surface treating step for each unit layer, wherein the surface treating step and the other surface treating step can be carried out in any order, and whereby a laminated thin film is formed by the unit layers. The Applicants respectfully submit that none of Yamato, Wang, Nguyen, and Raaijmakers, nor any combination thereof, teach, suggest, or render obvious all of the features recited by amended Claim 8.

Yamoto as cited discloses contacting a catalyst using the silane, ammonia and hydrogen. Yamoto also discloses a hydrogen gas treatment after forming the SiN film. The Office Action admits that Yamoto does not teach a repetition of a multi-cycle. The Applicants submit that Yamoto also does not teach lamination of silicon nitride layers formed by Cat-CVD or surface treatment of the formed silicon nitride layers. Rather, Yamoto merely describes a method of solving the problem that metal impurities are contained in the formed silicon layers which are caused by using a hot catalyst when forming polycrystalline silicon layers or single crystal layers by Cat-CVD. One of the embodiments, which is described in paragraphs [0143] to [0150] of Yamoto, merely mentions an example of forming a silicon nitride layer before forming a polycrystalline silicon layer by Cat-CVD.

Wang as cited teaches SiN film forming and an additional nitrogen gas treatment which are followed by treatment by active species of hydrogen gas. See Figure 2. Furthermore, paragraph [0037] describes that a silicon nitride layer having a thickness of 100Å or less and ideally less than 50Å is formed, the silicon nitride film is then annealed with hydrogen radicals, and the process is repeated several times so as to obtain a desired film thickness. Paragraph [0033] describes decomposition of a hydrogen treatment gas by using catalytic filament in order to form hydrogen radicals.

Nguyen teaches a method to supply a fixed quantity of source gas which is pulsed by switching a valve even though it is an ALD (Atomic Layer Deposition) method.

Raaijmakers teaches the treatment of SiN film by ammonia. Raaijmakers also describes the use of a mass flow controller (MFC) as a means of supplying a fixed quantity of source gas as mentioned in paragraph [0051].

In view of the above, the Applicants respectfully submit that none of Yamato, Wang, Nguyen, or Raaijmakers, nor any combination thereof, teach, suggest, or render obvious at least the combination of features recited by amended Claim 8.

Claims 9-18 depend directly or indirectly from Claim 8. The Applicants respectfully submit that these dependent claims are allowable at least for the same reason Claim 8 is allowable, as well as for the additional subject matter recited therein.

For at least the above reasons, the Applicants respectfully request reconsideration and withdrawal of the rejection of Claims 8-18 under 35 U.S.C. §103(a) over Yamato, Wang, Nguyen, and Raaijmakers.

Conclusion

The Applicants respectfully submit that this application is in condition for allowance and such action is earnestly solicited. If the Examiner believes that anything further is desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the Applicants' undersigned representative at the telephone number listed below to schedule a personal or telephone interview to discuss any remaining issues.

In the event that this paper is not being timely filed, the Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to Counsel's Deposit Account Number 01-2300, referencing Docket Number 029567-00011.

Respectfully submitted,



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